

SPITTLE SHARING AMONG FROGHOPPER SPECIES

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A fourth-instar nymph of the meadow froghopper *Philaenus spumarius* (L.) was found inhabiting a spittle mass produced by two fifth instar nymphs of the froghopper *Aphrophora alni* (Fallén) feeding on *Geum urbanum* in Perry Woods, Kent on 2 June 2007. The nymphs of the two species appeared to be feeding normally without any detrimental effect on each other, the slightly enlarged spittle mass affording them a reasonable measure of protection. Over the past 10 years these two species have been found co-inhabiting the same spittle masses on four occasions, with, in one case, five nymphs in a single spittle. In all cases, the host species appeared to be *A. alni* (Plate 2, Fig. 3), since the habitat favoured this species. These joint occurrences are rare and have not been reported by other researchers studying froghopper nymphs in the UK (e.g., Whittaker, 1971).

The frequency of spittle sharing depends on the extent of natural movement of nymphs to new feeding sites as they develop (*P. spumarius* > *A. alni*), the degree of overlap of developmental period and shared habitat and foodplant preferences. Both froghopper species occur in woodlands particularly along woodland rides across most of England and Wales and share a number of herbaceous host plants, so there is a reasonable chance they may co-inhabit the same spittle mass. There appears to be an advantage in feeding gregariously in the case of *P. spumarius*, as adult mass (hence fecundity) has been shown to increase as group size increases from one to five nymphs per spittle (Wise *et al.*, 2006). All froghoppers are assumed to be xylem feeders and so have to be capable of overcoming the large negative pressures under which xylem fluid is transported in plants (Crews *et al.*, 1998). It is possible that multiple feeding at a single site may allow a group of insects to disrupt the normal xylem flow in that region of the plant in such a way as to enhance food uptake (Wise *et al.*, 2006). Sharing of spittle masses may also help nymphs to conserve energy in maintaining the volume of spittle which provides the inhabitants with a significant measure of protection from predators and parasitoids (Whittaker, 1970; Wise *et al.*, 2006).

A large spittle mass containing three froghopper species, two nymphs of *Aphrophora salicina* (Goeze), and a single nymph each of *A. alni* and *P. spumarius* was found on a bramble stem on a woodland boundary at Bough Beech reservoir, Kent on 5 June 1994. The site and date are both relevant since the woodland edge is the only place where the three species breed in close proximity and have a chance to intermix, and the late date is at a time when more mature instars are present which tend to move greater distances in search of new feeding sites. This applies particularly to *A. alni*, which in its early instars feeds at ground level and only moves higher into the vegetation (up to 50 cm) in the fourth and fifth instars. The presence of nymphs of *A. salicina* on bramble was due either to the nymphs having wandered naturally onto the plant or having fallen from the willow tree above (the primary host plant) as a result of wind action.

It is possible that other combinations of two froghoppers species occur. It is unlikely that more than three froghopper species will be found sharing the same spittle, at least in the UK, since most of the other native species feed primarily on monocotyledons in preference to dicotyledons. There is a possibility of spittle sharing

in *Aphrophora major* Uhler and *A. pectoralis (costalis)* Matsumura though the chances are much lower since both are local species in the UK.

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The occurrence of soft scales (Coccidae) on ornamental yew *Taxus baccata* – An infestation of yew scale *Parthenolecanium pomericum* (Kawecki) and cottony camellia scale *Pulvinaria (Chloropulvinaria) floccifera* (Westwood) was rediscovered on one of the yew hedges in the second author's garden in Selling, Kent on 15 July 2007 (Plate 2, Fig. 4). The infestation was first noted in 1992, and, at the time, was the first known occurrence of cottony camellia scale on yew in the UK known to the first author. Control measures were subsequently taken and the two species have only resurfaced in noticeable numbers in the hedge during the past two years. Re-infestation of yew by *P. floccifera* may have occurred through the spread of motile first instars from some of the large *Camellia* bushes elsewhere in the garden which support low numbers of this species.

The current status of these insects in the UK based on records from the Central Science Laboratory is worth noting. True yew scale *P. pomericum* is not commonly recorded in Britain but has been collected throughout much of England and Wales, most frequently in the south. It is host specific to *Taxus* and occasionally numbers can build up causing chlorosis and defoliation.

Pulvinaria floccifera is particularly interesting, as it appears to be becoming more abundant, extending its geographical distribution and host range in Britain and is becoming more significant as a plant pest. Twenty years ago, this species was largely restricted in distribution outdoors to southern England. In recent years it has become more abundant (the Central Science Laboratory has received more samples of this species from different localities during the first half of 2007 than ever recorded previously during a similar period) and has extended its distribution northwards and is locally common in Yorkshire and Cumbria. Previously it was largely confined to *Camellia* and holly in Britain, but in recent years has been recorded from bay laurel, *Choisya*, *Citrus*, *Kalmia*, *Pieris*, *Pyracantha*, *Magnolia*, *Rhododendron*, *Trachelospermum* and yew.

It has become more important as a plant pest and is listed among the top ten garden pests by the Royal Horticultural Society (see www.rhs.org.uk). The foliage of infested plants often becomes covered in sooty mould which grows on the honeydew excreted by the scale insects. Extensive damage to rhododendrons has recently been reported from the Lake District. The changes in status are presumably due in part to climate change and it is highly likely that more and more gardeners will encounter *P. floccifera* in the future. – CHRIS MALUMPHY, Central Science Laboratory, Sand Hutton, York YO4 1LZ & JOHN BADMIN, Coppice Place, Selling, Kent ME13 9RP